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Big Data: The Path to Mission-Centric Analytics

While many agencies already are reaping the rewards of big data analytics, some have yet to even get started.

Not long ago, people were talking about how the U.S. federal government would manage the hundreds of thousands of petabytes of data it collects. Today, that discussion involves exabytes (bytes in the quintillions) of data. The problem of how to harness that data and turn it into actionable intelligence is a major focus of the Obama administration, which in 2012 pledged $200 million to massive big data R&D programs.

The challenge of how to use all that data to improve decision-making, reduce risk, increase efficiencies and lower costs is common to all federal agencies. Across the board, agencies understand these benefits, yet some agencies are much further along the path to realizing the full benefits of big data. Others seem somewhat overwhelmed about the expertise and expense required to make the most of big data.

These findings represent some of the results of a recent survey conducted by Beacon Technology Partners and underwritten by Unisys. Further, the survey sheds light on the importance of big data analytics in meeting mandates, concerns about fully committing to the process, the types of robust tools agencies are using or considering, and what steps agencies will likely take to make big data analytics a reality.

AGENCIES REAP THE BENEFITS

More than half the agencies polled have either ongoing big data initiatives, have green-lighted one or more pilot projects, or are actively considering adopting big data deployment in the near future. These agencies strongly agree that adopting big data analytics has become a vital tool in helping their agencies accomplish their strategic goals.

According to the survey, 55 percent of agencies are turning to big data to improve data security. For example, some agencies are using big data analytics to detect advanced threats by automating the process of examining machine data and identifying inconsistencies. With that information, agencies can link events together to understand how an attack has occurred, or to stop it in its tracks. By collecting and analyzing information now, agencies can improve cybersecurity over time.

The survey also found that more than 60 percent of agencies are using big data to reduce costs such as capital and operating expenses. By analyzing transactions, for example, agencies can find payments that may have been made erroneously or incorrect invoices. Agencies can then go a step further, using root cause analysis to determine what caused those errors. With that information, agencies can take action to ensure that these issues don't recur.

Agencies with big data projects already underway clearly are reaping the benefits. More than 90 percent say it has improved the quality and speed of decision-making, while nearly 90 percent agree that it has improved the ability to predict trends, boosted internal process efficiency, and resulted in better risk quantification.

The survey found that on average, agencies' data is about 40 percent structured, 18 percent unstructured, 20 percent semi-structured and 23 percent real-time data. Unstructured data is data that doesn't fit into the traditional database model. Examples include e-mail messages, images, documents, videos, audio files, photos and presentations. Structured data is stored in a database. Examples include machine-generated data from sensors and GPS systems, product information, call data records and Web server logs. It also includes human-generated data such as age, zip code, gender and so on. Semi-structured data typically is structured data without a rigid structure. Examples include metadata metadata from documents, e-mail messages and graphics.

That's precisely why agencies need big data analytics. Traditional analytics tools are designed to analyze only structured data. Big data analytics, on the other hand, enables better analytic insights by integrating varied types of data. Put another way, big data analytics evaluates all data types to create more context and deliver more valuable outcomes.

CONCERNS HAMPER SOME AGENCIES' PROGRESS

Despite an agreement that big data is crucial to accurate decision-making, efficiency and risk qualification, the survey found that 4 in 10 agencies have no current plans regarding big data. Many of them are civilian agencies.

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One of the most popular reasons given for the hesitance was the lack of staff resources, specifically business and data analysts, data scientists, engineers and data architects. The survey found that one in three has found it difficult to locate experts with the necessary experience.

Of agencies with existing big data projects, 73 percent were concerned about the strain that big data analytics would put on existing IT storage, computer and networking infrastructures, and that preparing for big data analytics would require a lengthy and expensive infrastructure refresh. Civilian agencies were more concerned than defense agencies about the strain big data would put on their legacy infrastructures, as well as network architectures.

Other concerns included the challenges of architecting analytic systems and uncovering actionable insights (60%), along with the time and overall cost of implementing big data analytics (77%).

Yet another major concern for agencies still on the fence was how to deal with the massive volumes of data that would have to be sorted through and saved, and the need for more robust analytic tools. In general, defense agencies are looking for more complex tools, such as Advanced Data Visualization, Complex Event Processing, OLAP tools and Natural Language Processing.

Despite these concerns, many agencies are moving in the direction of big data analytics. Two agencies in five increased or plan to increase their budgetary allocation requests to fund big data projects in the next fiscal year, and hiring of big data analysts, data scientists and architects will continue across the federal landscape.

The majority also plan to upgrade their data center and Network Operations Center infrastructures. Sixty-three percent plan to increase network bandwidth, 55 percent to add more robust data security, 54 percent to add cloud-based analytic services, and 50 percent to create a more agile and flexible network architecture.

Because of the complexity of the process and concerns about expertise, infrastructure and cost, many agencies plan to turn to third-party contractors and consultants to help with or assume responsibility for their big data initiatives. While 23 percent plan to fully outsource the work to third-party suppliers, 47 percent plan to combine the expertise of in-house and outsourced resources to get the job done. And it's coming soon; the survey found that 46 percent plan to increase their use of third-party consultants and contractors for big data initiatives in the coming year.

External experts can evaluate the existing infrastructure and determine whether the best option is upgrading to take advantage of big data analytics, or by pursuing big data analytics-as-a-service. These experts can also develop and integrate customized predictive models and other analytics tools into the infrastructure – and can provide qualified staff to run the big data initiative, if needed.

CONCLUSION

The results of the survey clearly show that big data is important to the future of federal government. Agencies are realizing benefits from their big data analytics programs for everything from improving cybersecurity and efficiency to reducing costs. While adoption of big data initiatives and data analytics tools is picking up, many agencies are delaying adoption due to concerns about the availability of skilled staff, the inadequacy of existing infrastructure and the overall complexity of these initiatives.

At the same time, it is evident from the survey that agencies know that big data tools and initiatives are important enough—not to mention required—that they must find a way to move forward. For many, the answer is relying on third-party consultants and contractors for analysis, insight, tools, implementation and management. Nearly half—46 percent—plan to increase their use of third-party consultants and contractors for big data initiatives in the coming year.

Federal Focus: Big Data

The push for agencies to collect, manage and gain insight from the massive amounts of data they routinely collect has been growing stronger every year. In 2012, the Obama administration announced a big data initiative that would help government learn how to extract and use relevant data. The next year, President Obama issued an executive order requiring federal agencies to begin collecting and publishing data in open, machine-readable formats and inventorying all data assets. He followed up on the promise to increase the importance of big data in government by appointing the first government-wide chief data officer.

To help agencies comply with big data requirements, the National Institute of Standards and Technology has released a draft of its Big Data Interoperability Framework, which aims to standardize a vendor-neutral, technology- and infrastructure-agnostic reference architecture.

These efforts have begun to pay off. Agencies have begun using big data to better identify cyberthreats, detect fraud and waste, identify trends, improve employee satisfaction and retention and increase efficiencies.